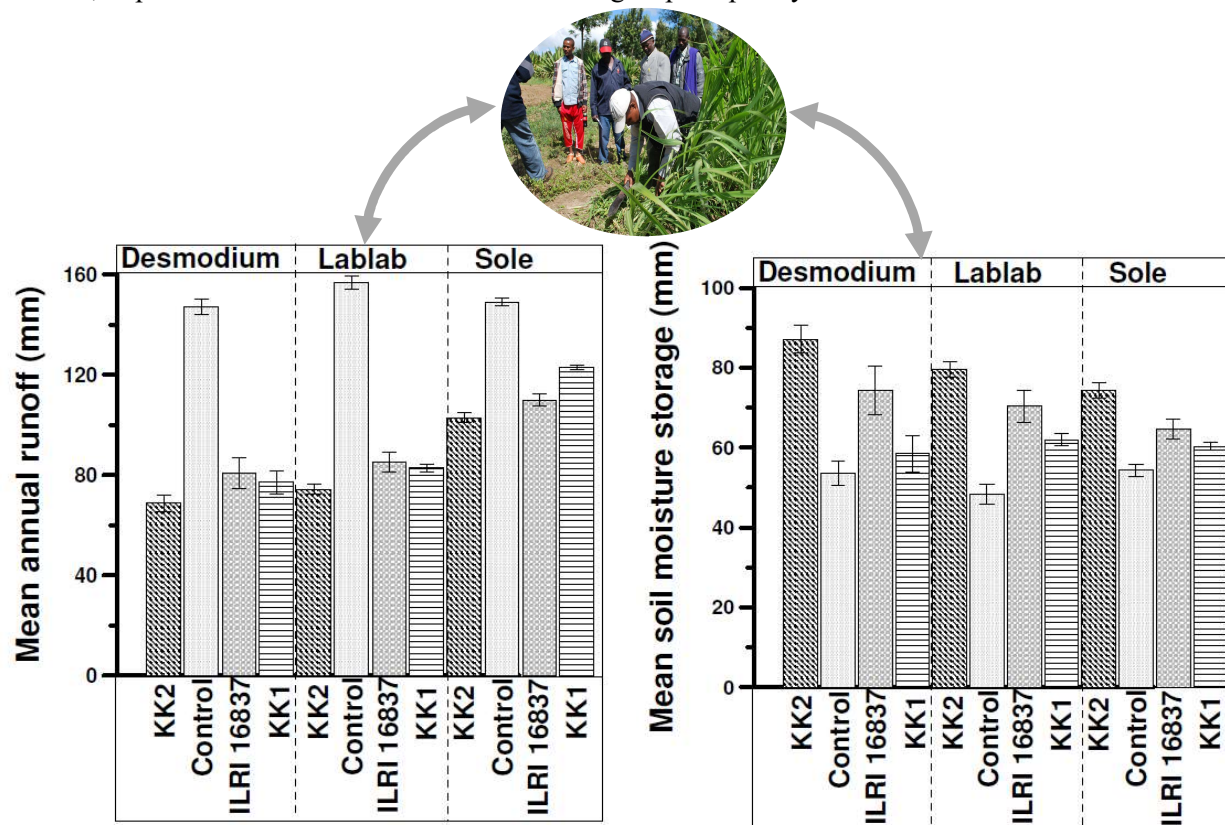


Integration of forages within smallholder agricultural systems:

Brief technology description: Cover and fodder crops are known for high nitrogen fixation. Africa RISING Scientists introduced soil and water conservation on terraces for sloping fields in Babati District. We demonstrate that compared to the control trials, runoff levels were not significant in areas with forage grass-legume intercrops which translated to 40-60% lower runoff; there was higher soil moisture storage with an average of about 25 mm of moisture over a depth of 50 cm (30% higher) in areas with forage-legumes than the control areas.

Associated benefits: Perennial forages reduced overall erosion and served as soil amendments through nitrogen fixation resulting in improved sustainability of farming systems in addition to contributing towards feed resources. These combinations allow for providing livestock feed requirements, household nutritional needs, providing marketability for the fodder legumes while playing a critical role in risk reduction as income buffers, as pest and disease control mechanisms though a push-pull system as a co-benefit.



Mean annual runoff and mean soil moisture storage trends among forage grass-forage legume combinations over two years 2014 and 2015.

Link to further information:

- Book Chapter that team published: <http://www.springer.com/gp/book/9783319412368>
- Infographic working draft for AR integrated systems: <https://cgspace.cgiar.org/handle/10568/76339>

Optimal spacing of soil and water conservation measures on hilly landscapes:

Brief description: Comparison of erosion amounts to varying slope gradients and lengths were conducted across three agro-ecological zones. We propose two conservative threshold limits for slope gradients and lengths to be $\leq 5\%$ length and ≤ 20 m if thresholds are above these limits (with no soil and water conservation interventions in place) in the target sites, this would result in significant soil losses and runoff which has implications on nutrient losses and reduced productivity. Based on these two threshold limits; we classified the slopes into 3 categories that we have shared with the District authorities:

1. Flat to gentle undulations (0 to $< 5\%$; less than 20 m slope length); constitute the first domain of sheet erosion.
2. Moderate to steep slopes ($> 5\%$ to $< 20\%$ gradient; > 20 m but < 50 m slope length): potential domains of active gully erosion and with potential expansion;
3. Very steep slopes ($> 20\%$ to $< 40\%$ gradient; > 50 m slope length): are prone to mass movement, severe rain splash and sheet erosion.

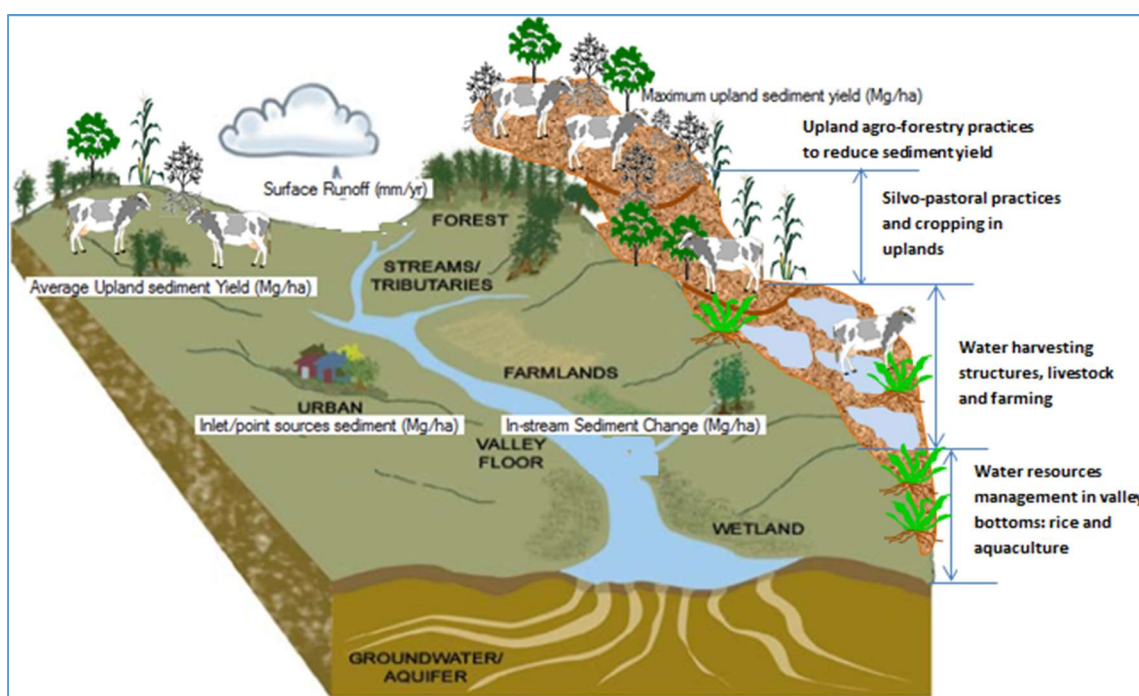


Illustration of optimal spacing interventions for terraces from farm scale to watershed scale interactions in association with sediment discharge and other landscape management options.

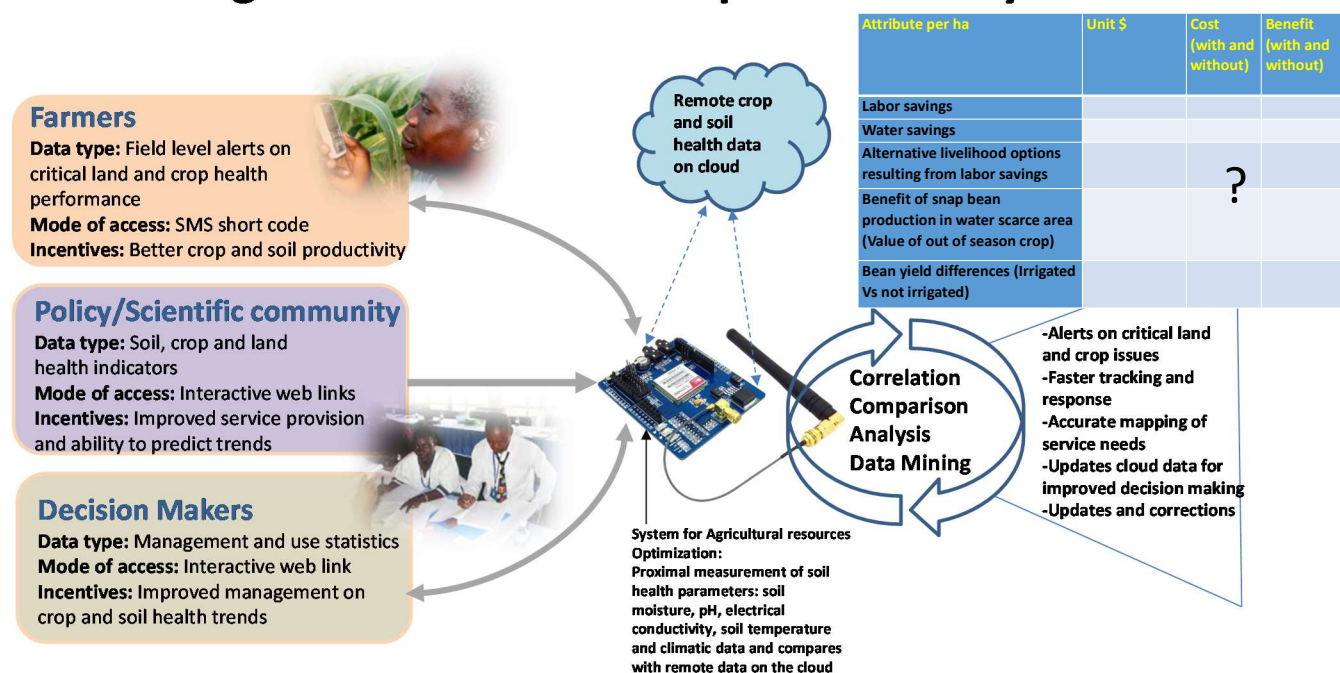
Link to further information:

- Current brief will be converted into a brochure for District authorities [can be accessed here](#)
- An erosion toolbox for estimation of the Erosion Hazard Index (EHI) [can be accessed here](#)

The Smart Agricultural Resources Optimization System (SAROS)

Brief narrative: This technology primarily targets smallholder farmers whose technical knowledge on soil and water issues is limited. The proposed solution is meant to bridge this knowledge divide thus allowing farmers to increase their technical efficiencies. By basing resource use decisions on actual climate-smart data and knowledge, the 'smart irrigation kit' reduces risk exposure to vagaries of rainfall variability associated with rain-fed agriculture allowing for better adaptation to climate change. The land management data logged to the back-end of the smart kit will allow farmers to query and receive information about the state of the soil and water resources from the convenience of their mobile handsets. This solution will also provide other stakeholders with a platform to monitor land health and resource use information thus mitigating any unintended environmental consequences. It also provides policy makers with information from field scale to landscape scale allowing better decision making across the board.

Smart agricultural resources optimization system



Link to further information:

- A presentation on details of SAROS [can be accessed here](#)
- A Poster on how the SAROS works [can be accessed here](#)